1. State the meaning of linear magnification. How is it related to object distance and image distance? When is magnification positive or negative?

Linear magnification gives the relative extend to which the image is magnified with respect to object size.

$m = \frac{hi}{ho}$ hi - height of image
ho - height of object.

It is the ratio of image distance to object distance.

Magnification is positive for virtual images.
Magnification is negative for real images.

2. State the types of spherical mirrors used for 1. Vehicle headlights and
2. rear view mirrors in vehicles. List two reasons to justify the use of these mirrors in each case.

1. Concave mirrors are used in vehicle headlights.
Reason - If the bulb is placed at the principal focus of the mirror, the rays of light coming from the bulb will be reflected and form a powerful, parallel beam of light.
2. Convex mirrors are used as rear view mirrors.
Reasons - The image formed is virtual, erect and diminished, independent of the position of object.

3. The magnification produced by a spherical mirror is "$+\frac{1}{4}$". Analysing this value, state (i) the type of the spherical mirror it is,
(ii) three characteristics of the image formed by the mirror.

3. $m = +\frac{1}{4}$, + shows that the image formed is virtual and erect. $\frac{1}{4}$ shows that the image formed is diminished compared to object.

(i) the spherical mirror is convex mirror.

(ii) virtual, erect and diminished.

4. a. lists the parts of human eye that control the amount of light entering into it. Explain how?

b. Write the function of retina in human eye.

c. If due to some disease or injury the cornea of an eye is clouded, then the vision is impaired and the person may become blind. This type of blindness may be cured by replacing the defective cornea with the cornea of the donated eye. Suggest some measures for motivating people to donate their eyes after death.

a. Iris and Pupil. When the light is very bright, the iris contracts the pupil to allow less light to enter the eye. But in dim light the iris expands the pupil to allow more light to enter the eye.

b. The eye lens forms an inverted real image of the object on the retina. The light sensitive cells present on the retina generate electrical signals. These signals are sent to the brain.

c. 1) I will make a short film showing the sufferings of blind people and present in front of our school community.

2) Conduct campaigns to encourage people to donate their eyes.

5. The Refractive index of water with respect to vacuum is 4/3 and R.I. of vacuum with respect to glass is 2/3. If the speed of light in glass is 2×10^8 m/s, find the speed of light in i. vacuum ii) water.

$$n_{wv} = \frac{4}{3} = \frac{V_v}{V_w} \quad \text{—①}$$

$V_v \rightarrow$ speed of light in vacuum
$V_w \rightarrow$ speed of light in water.

$$n_{vg} = \frac{2}{3} = \frac{V_g}{V_v} \quad \text{—②}$$

$V_v = ?$ $V_w = ?$

$V_g = 2 \times 10^8$ m/s.

From ②,

$$\frac{2}{3} = \frac{V_g}{V_v}. \qquad V_v = \frac{3}{2} V_g = \frac{3}{2} \times 2 \times 10^8$$

$$V_v = \underline{3 \times 10^8 \text{ m/s}}$$

$$V_w = \frac{3}{4} V_v = \frac{3}{4} \times 3 \times 10^8 = \underline{\frac{9}{4} \times 10^8 \text{ m/s}}.$$

6. To construct a ray diagram we use two light rays which are so chosen that it is easy to know their directions after refraction from the lens. List these two rays and state the path of these rays after refraction. Use these two rays to locate the image of an object placed between 'f' and '2f' of a convex lens.

1. A ray of light parallel to the principal axis passes through the focus after refraction (convex lens) / diverge such that it appears to come from the principal focus. (concave lens).
2. A ray of light that passes through the optic centre will go undeviated after refraction.